349 springs. In early morning 2 men hid inside blind;
224 as birds, small game came to water one man shot them, other went outside to gather them in. This done chiefly on piñon expeditions. Traps, blinds, etc., used especially on camp-hunting expeditions, when men, women went E to desert in small groups to camp for week or so and gather food (SM; Voegelin, 1935 b, 211).

223 Waterfowl shot with bow and arrow; mud hens when very fat "couldn't fly; it was easy to shoot
● [373] them" (SM). Lighted torches, made from sticks on which pitch had been smeared, waved under trees where quail roosting at night; as birds flew down they were easily clubbed. Inflammable brush never piled up and fired to attract waterfowl; live or stuffed birds not used as decoys.

252 Preparation of animal food.- Deer, other large game skinned while warm as it lay on ground; incisions made with stone knife as among Havasupai (Spier, 1928, 111); skin removed with knuckles of closed hand; "not much fat left on hide when it was skinned this way" (SM). Entire deer utilized; meat, guts laid directly on live coals to broil; meat never eaten raw, preferred "half done." Bones
[887] roasted, cracked, and marrow extracted. Old people with few teeth given liver (nï·man), which they pounded in small mortars or on flat rock. Flesh of other large game also either broiled on coals or stewed in clay pots; birds gutted (not gutted, MM), and plucked, roasted in ashes or impaled on stick and roasted over fire. Rabbits skinned, gutted, and broiled on coals, roasted in ashes, or stewed. Raccoons, of which Tübatulabal "ate lots," squirrels, woodrats gutted, hair singed off, roasted whole in hot ashes. All small game removed from ashes with "any kind of a stick." Deer head roasted in pit oven (šo·lï·l, hole). Hole dug in ground, sides and bottom lined with flat rocks heated on open fire; head, unwrapped, denuded of horns, put into pit, covered with hot flat rock and pit sealed with sand or earth. Pit
[177] opened 12-14 hours later; head generally put in around sundown, taken out and eaten next morning. Cow heads now occasionally roasted in this way.

226 Fish and mollusks.- Fish, both fresh and dried,
131 of importance in Tübatulabal diet. Obtainable in South Fork of Kern r., augmented and unaugmented Kern, streams such as Erskine creek, former lakes in South Fork valley, mt. lakes in hinterland. Fish (kuyu·l) included trout (ha'ayal), said to be native in mt. creeks (SM, FP), whitefish or bullheads (co·h), suckers (nimal), catfish (kana·ganan), minnows (ko'oši'). Whitefish caught in irrigation ditches 30 yrs. ago so large that "when a man carried one over his shoulders, the tail of the fish scraped the ground" (FM); MM said man could hardly lift some of fish caught in corrals (below) and FP commented on how large fish were formerly.

Fresh-water mussels (čono', twins), which Gifford suggests are probably Anodonta oregonensis,

[p. 13 (b)]

372 Fire drill.- Hearth (a·da·wa·yat) for fire-drill made from piece of dry cottonwood root (utu·lan wi·šin) from Populus fremontii; single hole in hearth; powder drained into channel leading to edge of hearth. Drill (a·da·wa·yišt) 2-2 1/2 ft. long, made from stalk of Baccharis glutinosa Pers. or B. viminea DC. Shredded cottonwood roots used for tinder.

413 Arrow straightener.- Arrow straightener
[171] (u·gišt) similar to Cahuilla straightener (Kroeber, Handbook, 530, pl. 49d); made from soft rock (steatite?; slate, FC), obtained near Chimney canyon in Tübatulabal area. Central
324 groove (loho·wi·nil) and incised lines on top surface of straightener cut with flint knife.
[171] SM's straightener, duplicate of steatite specimen from s. San Joaquin valley (Gifford and Schenck, pl. 17o), 3 in. long, 1 1/2 in. wide, 1 1/2 in. high at center, 1 in. wide at ends; single transverse groove 1/2 in. deep cut across top center, dividing convex top surface into 2 halves. Series of diagonal parallel lines, incised to depth of 1/16 in., cover one of halves of top surface; on other half series of 11 short parallel ridges cut out in low relief; incised lines and serrated ridges used for same purpose
[171] as noted among Yokuts (Kroeber, Handbook, 530). FC's straightener round, with 2 grooves; lacked incised lines, ridges; specimen 1-19802,4 in. long, 1 1/2 in. high, has single groove, no lines; specimen 1-19803 is 4 in. long, 1/2 in. high, has 2 grooves; SM said some little individual variation in size, markings on straighteners, depending on man's preferences.

413 Netting shuttle.- No information obtainable;
286 SM thought some variety of shuttle formerly used.

## FIRE

221 In winter, small fire inside dwelling served for cooking, heating, and lighting house at night;
372 in summer, cooking fire often built outside un-
373 der shade. Women also often cooked acorn mush at spot where they leached meal. During summer hand games played at night around fire, outside in open; brush enclosures illuminated at night by fire built in center; sweat house heated, illu-
[756] minated by open fire. Shamans used small open fire during shooting contests. Torches used for hunting quail (p. 13), but not for lighting.

372 Firemaking.- Fire made by men only, with simple hand drill (supra); man knelt (Kroeber,
462 Handbook, 822, pl. 78); SM said it took from
177 15-20 minutes to make fire with drill, but this seems unlikely. In 19th century Tübatulabal learned to make fire from Mexicans by striking upper edges of 2 white quartz strike-a-lights (ki·li·l) together (fig. 7a); "the Mexicans used one of these pieces of stone against a piece of